

**DFM**

Danish National Metrology Institute

ABOUT DFM

DFM is Denmark's National Metrology Institute (NMI). DFM is a signatory to the CIPM-MRA arrangement that ensures mutual recognition of measurements worldwide

TRACEABILITY

All measurements are traceable to recognised national and international standard.

ISO CERTIFICATION

All services are covered by DFM's ISO 9001 certification

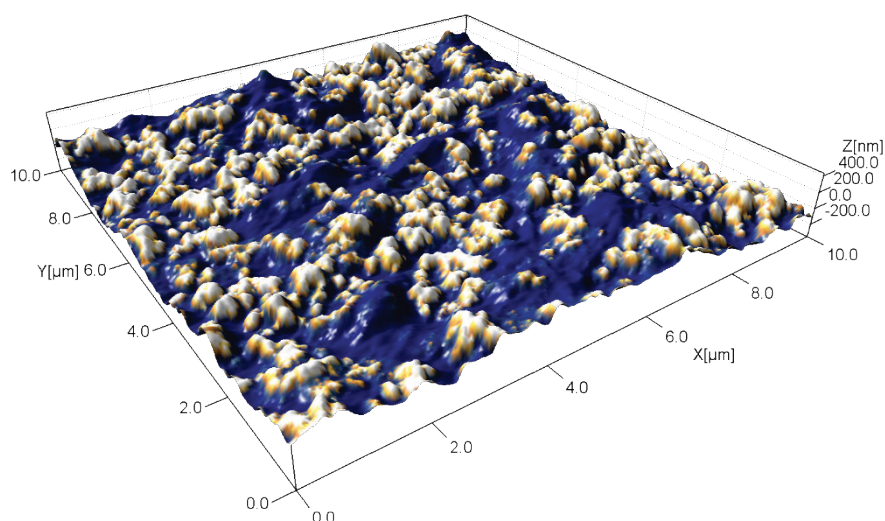
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Drug delivery systems

Surface characterization of drug delivery systems at the micro- and nano-scale



Applications

The need for advanced drug delivery systems has led to the development of multicomponent delivery systems based on e.g. polymers and hydrogels. These novel systems, formed by self-assembly, self-aggregation, and phase separation, for instance, are typically heterogeneous in the micro- and nano-scale. Consequently, the characterization of these delivery systems has been a challenge so far.

DFM offers surface characterization of drug delivery systems using AFM, Atomic Force Microscopy. AFM is a powerful tool for characterizing surface properties of drug delivery systems due to the following features: (1) high resolution, down to the nanometer scale, (2) operating in ambient conditions and in liquid, (3) obtaining multiplex information including topography and nanomechanical properties.

Spatial distribution and nanomechanical mapping of components, including carrier components and possibly drugs, can be obtained. The measurement can also be performed in hydrated samples, or in aqueous environment. These measurements serve as the basis for establishing structure-function relationship, which is essential for the rational design of drug delivery systems.

CONSULTANCY SERVICES

Do you need new measurement capabilities, does a method call for a bit of scrutiny, or are you perhaps seeking to acquire new equipment? Take advantage of the consultancy services we provide in addition to our calibration services.

As an independent institute deeply rooted within research and metrology, DFM has gained the reputation of being an agile, solid, and valuable partner. Contact us and find out why.

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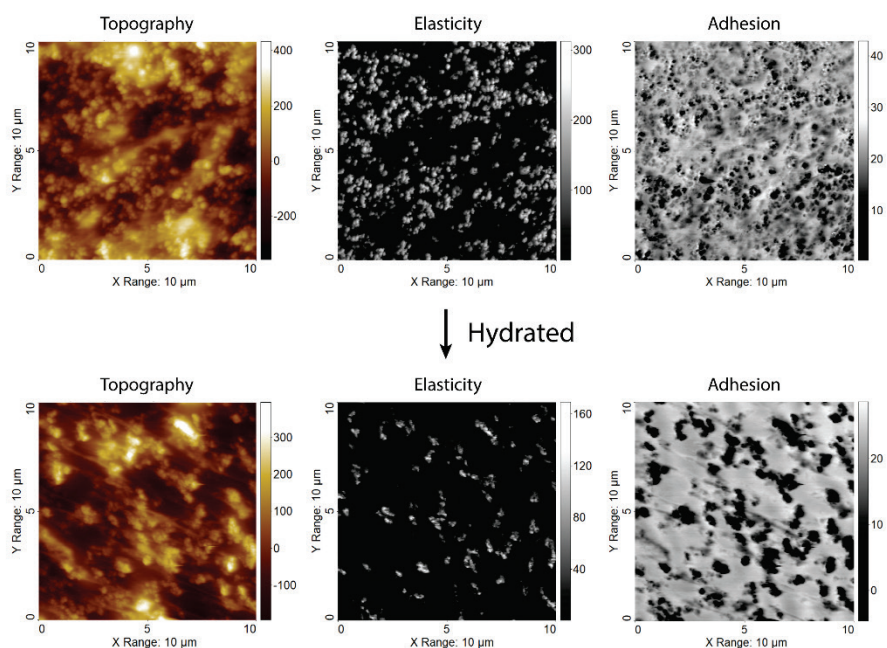
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Services and specifications

- K07.212 AFM surface characterization of drug delivery systems, acc. to quotation

Surface topography and mechanical properties will be measured by AFM under ambient conditions or in liquid.

- Maximum image range: 100×100 μm
- Maximum height range: 13 μm
- Resolution: As low as 0.1 nm for Z and 1 nm for X and Y (sample dependent)
- Medium: Air, water (buffer)
- Sample requirement: Maximum lateral dimension of 1.5 × 1.5 cm, with a smooth surface (contact us for details)



The figures above show an example of how DFM carried out a measurement of the surface topography and nanomechanical properties (elasticity and adhesion) of a hydrogel-silicone drug carrier system before and after hydration. The measurement clearly visualizes the distribution and size of the rigid hydrogel particles embedded in a silicone matrix, as well as the response to hydration. Quantitative information, such as elasticity, adhesion (to AFM probes), particle size, proportion of components, can be obtained from further image analysis.

Examples of related services

The AFM surface characterization service complements our existing test and measurement services within micro and nanotechnology, such as

- K07.001, K07.002 AFM calibrations of two-dimensional gratings
- K07.003 Calibration of step height with AFM
- K07.210 AFM meas. of adhesion, acc. to quotation
- K07.211 AFM meas. of structural surface stability, acc. to quotation